UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/623,646	07/22/2003	Chia-Chen Chen	0941-0794P	4737

2292 7590 09/02/2009
BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER	
BROOME, SAID A	
ART UNIT	**PAPER NUMBER**
2628	
NOTIFICATION DATE	**DELIVERY MODE**
09/02/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No. 10/623,646	Applicant(s) CHEN ET AL.	
	Examiner SAID BROOME	Art Unit 2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 May 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-6 and 8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-6 and 8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This office action is in response to an amendment filed on 5/20/2009.

2. Claims 1, 2, 4-6 and 8 are original.

4. Claims 3 and 7 have been cancelled.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 4-6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (hereinafter "Lee", "*Fast head modeling for animation*") in view of Migdal et al. (hereinafter "Migdal", US Patent 6,208,347).

Regarding claim 1, Lee teaches a computer-implemented method of reconstructing a regular 3D model by feature-line segmentation (pg. 1 1st ¶ lines 1-5: "*...a method to reconstruct 3D facial model for animation…based on extracting features on a face...and modifying a generic model with detected feature points.*", Fig. 1), comprising using a computer to perform the steps of:

(a) inputting original 3D model data (sec. 2.1 3rd ¶ lines 1-4: "*…camera is used to generate range data of faces. We can convert some part of the range data in VRML format to appropriate to our need as input if necessary. We visualize the range data in front view as it is*

and rotate and translate to show the right and left views together as shown in Figure 3.", *where 3D VRML range data input shown in Fig. 3(a) is initially collected from cameras to provide three-dimensional model data*);

(b) drawing 3D feature-lines according to the original 3D model data and user requirements (sec. 2.2.1 1st ¶ lines 1-3: "*…to fit a contour…we move a few points to the corresponding position interactively…*", sec. 2.4.1.1 lines 3-6: "*<u>We define two sets of feature points</u> (one for the left part and the other for the right part) on the front view, intending to keep original (high) resolution for a major part of the front view, which <u>lies between two feature lines.</u>*", capt. of Fig. 3(b) line 1: "*Feature detection on a front view and depth calculation on side view.*" *and is shown in progression from Fig. 3(a) to Fig. 3(b), where contour lines connected by feature points are utilized to outline the features of the original 3D model, as defined by a user*);

(c) converting the 3D feature-lines into continuing 3D threads (Figs. 2 & 3(b)) wherein the 3D threads are composed of connection joints, connection lines, and loops (pg. 3 sec. 2.2 1st ¶ lines 6-9: "*To get correspondence between points from…points on a generic model…a snake is a good candidate…we add some more functions…as structure snake…*", Fig. 3(b)), wherein the connection joints are intersection points of the 3D feature-lines, the connection lines are the 3D feature-lines between two connection joints (Fig. 3(b)), and the loops are closed zones constructed by the connection lines (pg. 3 sec. 2.2 1st ¶ lines 6-9: "*To get correspondence between points from pictures and points on a generic model, which has a defined number, a snake is a good candidate. Above the conventional snake, we add some more functions called as structure snake, which is useful to make correspondences between points on a front view and*

ones on a side." and Figs. 3(b) & 4(b), *providing a snake forming a loop outlining an outer shape of the model's feature lines*, Fig. 2);

(e) producing a regular triangular grid sample model according to the continuing 3D threads (Fig. 5(a)); and

(f) projecting the regular triangular grid sample model into the original 3D model to produce a reconstructed 3D model (pg. 6 sec. 2.3.2 1st ¶ lines 1-6 - pg. 7 lines 1-9: "*...to get accurate positions... We collect feature points...of corresponding points on original range data. Then we calculate Voronoi triangles of chosen feature points...The Voronoi triangles and collected points on a surface are shown in Figure 5 (a)...Then...projection of points are used...to get the corresponding accurate coordinate in a range data...Figure 5 (c) is the final result...*", *where the captured feature points forming the triangular grid of* Fig. 5(a) *are projected onto the original range data*, pg. 3 sec. 2.1 3rd ¶ lines 1-4: "*...camera is used to generate range data of faces. We can convert some part of the range data in VRML format to appropriate to our need as input if necessary. We visualize the range data in front view as it is and rotate and translate to show the right and left views...*", *in order to generate the reconstructed model of* Fig. 5(c)). However, Lee fails to teach determining sample numbers of each connection line, adding or deleting the loops, and outputting the 3D threads, redetermining the number of sample points on each connection line, readding or redeleting the loops, and repeating steps (e) and (f) if the reconstructed 3D model does not satisfy resolution requirements from the user, and outputting the reconstructed 3D model if the reconstructed 3D model satisfies the resolution requirements and wherein the sample points for the reconstructed 3D model are located on the connection lines despite of the number of sample points;

Migdal teaches (d) determining sample numbers of each connection line, adding or deleting the loops, and outputting the 3D threads (col. 22 lines 38-47: "…*as 6D data points are added to or removed from the mesh, the faces of the mesh change. When those faces are changed, values calculated for any 6D data points associated with the face can change…When such alterations occur, the computer system 3 must calculate new values for the affected 6D data points or rearrange their associations with particular mesh faces.*" and in col. 27 lines 8-40: "…*computer system 3 of the present invention can fully…describe…the basic shape contours…of an object with relatively few selected points…data points obtained from a laser scan of a person's face can be typically simplified…which describe the contours…with good resolution…incrementally adding…points of detail from the mesh until the mesh meets the resolution set by the user's specification…*", *where the number of points, or density, that comprises the interconnecting lines and loops of the mesh is determined as vertices are added and deleted*); and

(g) redetermining the number of sample points on each connection line, readding or redeleting the loops, and repeating steps (e) and (f) if the reconstructed 3D model does not satisfy resolution requirements from the user, and outputting the reconstructed 3D model if the reconstructed 3D model satisfies the resolution requirements (col. 27 lines 8-40: "…*computer system 3 of the present invention can fully approximate, describe and reproduce both the basic shape contours and color details of an object with relatively few selected points…data points obtained from a laser scan of a person's face can be typically simplified from an initial set of 100,000 data points to a mesh of a few thousand data points which describe the contours and color details with good resolution…incrementally adding…points of detail from the mesh until*

the mesh meets the resolution set by the user's specification…" and in col. 9 lines 23-29: "*…the present system and method maintains an optimal structure at all times during "up resolution" or "down resolution" mesh construction…Optimal construction refers to the "connectivity" of the mesh or the interconnection of the edges that join the data points and define the geometric primitives of the mesh…*", *where the density of the points comprising the contour lines, or connection lines, of the mesh are continually incrementally calculated or redetermined until the desired resolution is reached*);

wherein the sample points for the reconstructed 3D model are located on the connection lines despite of the number of sample points (col. 27 lines 8-21: "*…computer system 3 of the present invention can fully approximate, describe and reproduce both the basic shape contours and color details of an object with relatively few selected points. As more detail is required, a system following the up resolution selection principle can add more details by simply adding the next most significant points...data points obtained from a laser scan of a person's face can be typically simplified from an initial set of 100,000 data points to a mesh of a few thousand data points which describe the contours and color details with good resolution.*" and col. 9 lines 23-29: "*…the present system and method maintains an optimal structure at all times during "up resolution" or "down resolution" mesh construction…Optimal construction refers to the "connectivity" of the mesh or the interconnection of the edges that join the data points and define the geometric primitives of the mesh…*", *where the sampled points remain on the connection or contour lines that provide the shape of the reconstructed model are maintained regardless of the changes in resolution of the model*). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to modify the snake connection lines of Lee with the

determined number of connection sample points provided by Migdal because this modification would provide efficient reconstruction of a 3D model through acquiring particular feature points, instead a large amount of mesh data, and producing a reconstructed 3D model from a regular grid formed based on the feature points, whereby the structure of the 3D model is efficiently maintained using connection lines despite changes to the mesh surface.

Regarding claims 2 and 6, Lee teaches that the 3D feature-lines are based on the exterior appearance and structure of the original 3D model (pg. 2 2nd ¶ lines 1-4: "*…a fast method applied to two kinds of input to get an animatable cloning of a person…feature detection is described to get rough shape of a given face from orthogonal picture data or range data…*", *and in* Fig. 1: *transition from range data to the feature extraction section, where the features of the outer structure of the 3D model is captured*).

Regarding claims 4 and 8, Lee illustrates combining the closed regular triangular grids of the loops as the regular triangular grid sample model (Fig. 5(a)). However, Lee fails to teach constructing regular triangular grids in each loop according to the sample points of each connection line in step (d). Migdal teaches constructing regular triangular grids in each loop according to the sample points of each connection line (col. 27 lines 22-26: "*…incrementally adding 6D points of detail from the mesh until the mesh meets the resolution set by the user's specification, or until the mesh is created to the highest density…*" and in col. 9 lines 23-29: "*…the present system and method maintains an optimal structure at all times…Optimal construction refers to the "connectivity" of the mesh or the interconnection of the edges that join the data points and define the geometric primitives of the mesh (e.g., the triangular mesh…*", *where points are incrementally inserted into the triangular grid, which provides continual*

generation of a mesh, as produced in step(d) of claim 1, based on the density or number of sample points of the mesh, as shown in the progression from Figs. 2c to 2d). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to modify the reconstructed 3D model of Lee with the mesh model resolution procedures of Migdal because this modification would provide accurate reconstruction of a 3D model through acquiring feature points, instead a large amount of mesh data, and producing a reconstructed 3D model from a regular grid formed based on the feature points, whereby the structure of the 3D model is efficiently maintained despite changes to the mesh surface.

Regarding claim 5, Lee teaches a computer-implemented method of reconstructing a regular 3D model by feature-line segmentation (pg. 1 1st ¶ lines 1-5: "*...a method to reconstruct 3D facial model for animation…based on extracting features on a face...and modifying a generic model with detected feature points.*", Fig. 1), comprising using a computer to perform the steps of:

inputting original 3D model data (sec. 2.1 3rd ¶ lines 1-4: "*…camera is used to generate range data of faces. We can convert some part of the range data in VRML format to appropriate to our need as input if necessary. We visualize the range data in front view as it is and rotate and translate to show the right and left views together as shown in Figure 3.*", *where 3D VRML range data input shown in Fig. 3(a) is initially collected from cameras to provide three-dimensional model data*);

drawing 3D feature-lines according to the original 3D model data and user requirements (sec. 2.2.1 1st ¶ lines 1-3: "*…to fit a contour...we move a few points to the corresponding position interactively…*" *and is shown in progression from* Fig. 3(a) to Fig. 3(b));

converting the 3D feature-lines into continuing 3D threads wherein the 3D threads are composed of connection joints, connection lines, and loops (pg. 3 sec. 2.2 1st ¶ lines 6-9: "*To get correspondence between points from…points on a generic model…a snake is a good candidate…we add some more functions…as structure snake…*", Fig. 3(b)), wherein the connection joints are intersection points of the 3D feature-lines, the connection lines are the 3D feature-lines between two connection joints (Fig. 3(b)), and the loops are closed zones constructed by the connection lines (pg. 3 sec. 2.2 1st ¶ lines 6-9: "*To get correspondence between points from pictures and points on a generic model, which has a defined number, a snake is a good candidate. Above the conventional snake, we add some more functions called as structure snake, which is useful to make correspondences between points on a front view and ones on a side.*" and Figs. 3(b) & 4(b), *providing a snake forming a loop outlining an outer shape of the model's feature lines*, Fig. 2);

producing a regular triangular grid sample model according to the 3D threads (Fig. 5(a)); and

projecting the regular triangular grid sample model into the original 3D model to produce a reconstructed 3D model (pg. 6 sec. 2.3.2 1st ¶ lines 1-6 - pg. 7 lines 1-9: "*…to get accurate positions…We collect feature points…of corresponding points on original range data. Then we calculate Voronoi triangles of chosen feature points…The Voronoi triangles and collected points on a surface are shown in Figure 5 (a)…Then…projection of points are used…to get the corresponding accurate coordinate in a range data…Figure 5 (c) is the final result…*", *where the captured feature points forming the triangular grid of* Fig. 5(a) *are projected onto the original range data*, pg. 3 sec. 2.1 3rd ¶ lines 1-4: "*…camera is used to generate range data of*

faces. We can convert some part of the range data in VRML format to appropriate to our need as input if necessary. We visualize the range data in front view as it is and rotate and translate to show the right and left views...", *in order to generate the reconstructed model of* Fig. 5(c)). However, Lee fails to teach determining a number of sample points on each connection line, adding or deleting the loops, outputting the 3D threads, wherein the sample points for the reconstructed 3D model located on the connection lines despite of the number of sample points;

Migdal teaches determining sample numbers of each connection line, adding or deleting the loops, and outputting the 3D threads (col. 22 lines 38-47: "*...as 6D data points are added to or removed from the mesh, the faces of the mesh change. When those faces are changed, values calculated for any 6D data points associated with the face can change...When such alterations occur, the computer system 3 must calculate new values for the affected 6D data points or rearrange their associations with particular mesh faces.*", col. 27 lines 8-40: "*...computer system 3 of the present invention can fully...describe...the basic shape contours...of an object with relatively few selected points...data points obtained from a laser scan of a person's face can be typically simplified...which describe the contours...with good resolution...incrementally adding...points of detail from the mesh until the mesh meets the resolution set by the user's specification...*", *where the number of sample points, or density, that comprise the contour connection lines and loops of the mesh are determined as vertices are added and deleted*);

wherein the sample points for the reconstructed 3D model are located on the connection lines despite of the number of sample points (col. 27 lines 8-21: "*...computer system 3 of the present invention can fully approximate, describe and reproduce both the basic shape contours and color details of an object with relatively few selected points. As more detail is required, a*

system following the up resolution selection principle can add more details by simply adding the next most significant points...data points obtained from a laser scan of a person's face can be typically simplified from an initial set of 100,000 data points to a mesh of a few thousand data points which describe the contours and color details with good resolution.“ and col. 9 lines 23-29: “*…the present system and method maintains an optimal structure at all times during "up resolution" or "down resolution" mesh construction…Optimal construction refers to the "connectivity" of the mesh or the interconnection of the edges that join the data points and define the geometric primitives of the mesh…*“, *where the sampled points remain on the connection or contour lines that provide the shape of the reconstructed model are maintained regardless of the changes in resolution of the model*). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to modify the reconstructed 3D model of Lee with the mesh model resolution procedures of Migdal because this modification would provide accurate reconstruction of a 3D model through acquiring feature points, instead a large amount of mesh data, and producing a reconstructed 3D model from a regular grid formed based on the feature points, whereby the structure of the 3D model is efficiently maintained despite changes to the mesh surface.

Response to Arguments

Applicant's arguments filed 5/20/09 have been fully considered but they are not persuasive.

In regards to claims 1 and 5, the applicant’s arguments states that Lee in Section 2.2.1 simply discloses that the correspondence between control points on a generic model and feature

points on pictures is obtained, which is not synonymous with the feature of “drawing 3D feature-lines according to the original 3D model data and user requirements” as recited claims 1 and 5. However, the applicant’s arguments are unpersuasive because Lee teaches 3D feature lines connected by feature points that are drawn (Fig. 3(b)) based on original 3D model data (Fig. 3(a)) and defined by a user (sec. 2.4.1.1 lines 3-6) and Fig. 3(b)), therefore the 35 U.S.C. 103(a) rejection of claims 1 and 5 has been maintained.

In regards to claims 1 and 5, the applicant’s arguments states that Lee nowhere teaches or suggests the reconstruction of a regular 3D model from an original 3D model as recited in claims 1 and 5. However, the applicant’s arguments are unpersuasive because Lee teaches reconstruction of a 3D model using original 3D model data, as clearly shown in the progression from Fig. 5(a) to 5(c), therefore the 35 U.S.C. 103(a) rejection of claims 1 and 5 has been maintained.

In regards to claims 1 and 5, the applicant’s arguments states that the reconstructed 3D model is locked in the same position despite of resolution changes. This feature is advantageous, for various applications utilize position information of the reconstructed 3D model for further editing and/or setting control points. Migdal does not teach or suggest a locked-position reconstructed 3D model, and does not provide the described benefits of the claimed invention. However, the applicant’s arguments are unpersuasive because Migdal teaches points comprised on a 3D model reconstructed due to changes in resolution are maintained on the model regardless of resolution changes (col. 9 lines 23-29), therefore the points along the surface are maintained, or locked, at particular position during the resolution transition, in which the 35 U.S.C. 103(a) rejection of claims 1 and 5 has therefore been maintained.

In regards to claims 1 and 5, the applicant's arguments states that Migdal nowhere discloses obtaining any connection lines as recited in claims 1 and 5. Migdal simply teaches using more or less original data points to change the resolution, but fails to teach obtaining any sample points from a non-existing line. Therefore, Migdal also fails to teach "determining a number of sample points on each connection line" as recited in claims 1 and 5. However, the applicant's arguments are unpersuasive because Migdal teaches obtaining contours, or lines, of data that form the shape of a model (col. 27 lines 8-40). In view of applicant's arguments, claims 1 and 5 do not recite obtaining any sample point from a non-existing line, therefore in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "obtaining any sample points from a non-existing line") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The applicant's arguments are also unpersuasive because Migdal teaches a determination of the number of points that reside on the contour lines connected using the points through calculation of the number of points to generate the contours that form the shape of the model (col. 27 lines 8-40), therefore the 35 U.S.C. 103(a) rejection of claims 1 and 5 has been maintained.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAID BROOME whose telephone number is (571)272-2931. The examiner can normally be reached on M-F 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571)272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Said Broome/
Examiner, Art Unit 2628

/Ulka Chauhan/

Supervisory Patent Examiner, Art Unit 2628